CLAIMS

What is claimed is:

1   1.   A method for diagnosing a failure in a network switching device comprising:

2   receiving a data packet containing a debug information element (IE) at the

3   network switching device;

4   extracting the debug IE from the data packet;

5   performing at least one diagnostic function on the network switching device in

6   response to information contained in the debug IE.

1   2.   The method of Claim 1, further comprising communicating results of said at

2   least one diagnostic function from the network switching device to a selected end

3   point connected to the network switching device via a communications link.

1   3.   The method of Claim 1, wherein the debug IE is embedded in a connection-

2   management message.

1   4.   The method of Claim 1, wherein the debug IE is formatted so as to be

2   propagated transparently across network switching devices that are not configured

3   to recognize the debug IE.

1   5.   A method for diagnosing a failure in a network switching device comprising:

2   embedding a debug information element (IE) in a message;

3   receiving results of at least one failure diagnostic function from a network

4   switching device configured to respond to the debug IE,

5   wherein the debug IE is formatted so as to be propagated transparently

6   across network switching devices that are not configured to recognize the debug IE.

1   6.   The method of Claim 5, wherein the debug IE is embedded in a connection-

2   management message.

1   7.   The method of Claim 5, wherein the debug IE includes information specifying

2   a network switching device on which the failure diagnostic function is performed.

1   8.   The method of Claim 1, wherein the debug IE includes information identifying

2   said at least one failure diagnostic function.

1   9.   A method for diagnosing a failure in a connection establishment path

2   comprising a plurality of nodes in a communication network, comprising:

3   embedding a debug information element (IE) in a data packet;

4   propagating the data packet to a plurality of switching devices corresponding

5   to respective nodes along the connection path;

6   extracting the debug IE at selected switching devices among said plurality of

7   switching devices; and

8   performing at least one diagnostic function on targeted switching devices

9   among said selected switching devices.

1   10.   The method of Claim 9, wherein the debug IE is embedded in a connection-

2   management message.

1   11.   The method of Claim 9, wherein the communication's network comprises a

2   plurality of ATM switching devices.

1   12.   The method of Claim 9, wherein the debug IE includes information specifying

2   the targeted switching devices.

1   13.   The method of Claim 9, wherein the debug IE includes information identifying

2   said at least one failure analysis function to be performed.

1   14.   The method of Claim 9, wherein the selected switching devices correspond to

2   switching devices supplied by a particular vendor.

1   15.   The method of Claim 14, wherein the debug IE is encoded in the data packet

2   such that it is passed along or dropped by switching devices along the

3   communication path that are not supplied by the particular vendor.

1   16.   The method of Claim 9, further comprising communicating results of said at

2   least one failure analysis function from the targeted switching devices to an operator

3   of the targeted switching devices or the communication network.

1   17.   The method of Claim 16, wherein the results from said at least one failure

2   analysis function are communicated to the operator of said targeted switching

3   devices by passing the results to a data station.

1 18. The method of Claim 17, wherein the results are passed to the data station

2 via at least one communication link that connects at least one of the targeted

3 switching device(s) to the data station.

1 19. The method of Claim 17, wherein the results are passed to the data station

2 by passing information from at least one of the targeted switching devices to another

3 switching device along the connection path, said another switching device passing

4 the results to the data station.

1 20. The method of Claim 9, wherein said targeted switching devices comprise

2 switching devices along a specific portion of the connection path.

1 21. The method of Claim 9, wherein said targeted switching devices comprise

2 switching devices that are members of a logical peer group in an ATM hierarchy.

1 22. The method of Claim 9, wherein the network comprises a PNNI (Private

2 Network-Network Interface) network.

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1 23. The method of Claim 9, further comprising:

2   identifying said plurality of switching devices comprising the communications

3 path;

4   identifying a switching device along the communications path corresponding

5 to a failure point in the communications path;

6   forwarding the message from switching device to switching device along the

7 communication path until it reaches the switching device corresponding to the failure

8 point; and

9   encoding the debug IE so as to instruct the switching device corresponding to

10   the failure point to perform at least on failure diagnostic functions to identify why the

11   switching device failed.

1   24.   An article of manufacture comprising a computer-readable medium having

2   computer-executable instructions for performing the functions of:

3   receiving a data packet containing a debug information element (IE);

4   extracting the debug IE from the data packet;

5   performing at least one diagnostic function on a network switching device in

6   response to information contained in the debug IE.

1   25.   The article of manufacture of claim method of Claim 13, wherein the

2   computer-executable instructions further perform the function of communicating

3   results of said at least one diagnostic function from the network switching device to

4   a selected end point connected to the network switching device via a

5   communications link.

1   26.   An article of manufacture comprising a computer-readable medium having

2   computer-executable instructions for performing the functions of:

3   generating a debug information element (IE) having a format so that it may be

4   propagated transparently across a network of switching devices that are not

5   configured to recognize the debug IE.

6   embedding the debug IE in a message; and

7   receiving results of at least one failure diagnostic function from a network

8   switching device configured to respond to the debug IE.

1   27.   The article of manufacture of Claim 26, wherein the debug IE is embedded in

2   a connection-management message.

1   28.   The article of manufacture of Claim 26, wherein the debug IE includes

2   information specifying a network switching device on which the failure diagnostic

3   function is performed.

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